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ABSTRACT

Three "Lab" schools were established in 1994-1995 in Durham, North Carolina public schools solely to provide smaller classes for disadvantaged inner-city students. In addition, smaller class sizes were achieved in two additional elementary schools by "cashing in" teacher aides and other more judicious use of available funds. These two schools were used as a comparison group in a study to determine the effects of smaller class size on achievement; students matched on appropriate test scores from other Durham schools were used as a control group. Focus groups were conducted with staff and parents at the three Lab schools to find out what they thought were optimal class sizes and the advantages of smaller classes for students. Test data used to analyze the relationship between class size and academic performance at all five schools included: (1) assessments from Marie Clay's Observation Survey; (2) the Developmental Reading Assessment; and (3) North Carolina End-of-Grade Test scores. State standards call for class sizes of 23 students for K-2 grades, and 26 for grades 3-5. The average class size for the Lab schools ranged from 14 to 21 for K-2 and from 11 to 22.5 for grades 3-5. The average class size for the comparison schools ranged from 13.9 to 20-3 for K-2 grades, and from 14.3 to 20.3 for grades 3-5. When asked what class size was "just right," responses from school staff ranged from 16-21 students; in contrast parent responses ranged from 10-19. Students in Lab schools had higher test gain scores than students in the comparison and control groups for Kindergarten, and for first and fourth grades. Students in the Lab and comparison groups had higher test gain scores than students in the control groups for Kindergarten and second grade. Alternatively, students in the control group had higher gain scores than those in the Lab and comparison schools for third and fifth grades. These findings suggest that smaller class sizes produce the largest and most consistent test gains among disadvantaged children in the earlier grades (K-2). Multivariate analysis of the data indicated that although test scores varied within and across groups by grade, there was a significant increase in test scores for students in all groups and in all grades. (Contains 17 references.) (HTH)

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ED 464 725

Class Size and Student Success: Comparing the Results of Five Elementary Schools Using Small Class Sizes

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Class Size and Student Success: Comparing the Results of Five Elementary Schools Using Small Class Sizes

Executive Summary

Three "Lab" schools were established in 1994-95 in Durham Public Schools. The purpose of these schools was to provide smaller classes for disadvantaged inner-city students. They were not Lab schools in the traditional use of the term as they were neither associated with a local university nor were they used to try out other educational innovations and experimentation. In addition, smaller class sizes were achieved in two additional elementary schools by "cashing in" teacher aides and other more judicious use of available funds. These two schools were used as a comparison group of schools.

Focus groups were conducted with staff and parents at the three Lab schools to find out what they thought were optimal class sizes and advantages of small classes for students. Test data used to analyze the relationship between class size and academic performance at all five schools with small class sizes included: 1) assessments from Marie Clay's Observation Survey; 2) the Developmental Reading Assessment; and 3) North Carolina End of Grade Test scores. Students matched on appropriate test scores from the other Durham Public Schools' elementary schools were used as a control group.

Enrollment. In 2001, there were 908 students enrolled in the three Lab schools, with student populations ranging from 186 to 376 students. There were 363 and 528 students at the two comparison schools.

Class Sizes. North Carolina State Standards call for class sizes of 23 students for grades K-2, and 26 students for grades 3-5. The average class size for the Lab schools ranged from 14 to 21 students for grades K-2, and from 11 to 22.5 students for grades 3-5. The average class size for the comparison schools ranged from 13.0 to 20.3 for students in grades K-2, and from 14.3 to 20.3 for students in grades 3-5.

Focus Groups. Thirteen Lab school staff members and 14 parents of Lab school students participated in the focus groups. When asked what class size was "just right" responses from school staff ranged from 16 to 21 students. In contrast, responses from parents ranged from 10 to 19 students. Staff and parents noted many advantages of having small class sizes for students at the Lab schools.

Academic Performance. Students in Lab schools had higher test gain scores than students in the comparison and control groups in kindergarten, and in the first and fourth grades. Students in the Lab and comparison groups had higher test gain scores than students in the control groups in kindergarten and the second grade. Alternatively, students in the control group had higher gain scores than students in the Lab schools and comparison group in the third and fifth grades.

These findings suggest that smaller class sizes produce the largest and most consistent test gains among disadvantaged children in the early (K-2) grades. Multivariate analysis of the data indicated that although test scores varied within and across groups by grade, there was a significant increase in test scores for students in all groups and in all grades.

Class Size and Student Success: Comparing the Results of Five Elementary Schools Using Small Class Sizes

Since 1994-95, Durham Public Schools has been operating "Lab Schools" in three of its elementary schools. In the traditional sense, Lab Schools are schools usually associated with a teacher training or education-related university or college where educational innovations can be "hot housed" (i.e., tried out in a lifelike setting). However, these three schools never have really fit this definition as they have never been affiliated with a university or college, nor have they been educational "hot houses." Rather, the DPS Lab Schools have utilized one educational idea—that a lower class size would have positive educational outcome results on students. Namely, these three inner city schools were provided with the resources to have a pupil-to-teacher ratio of 17 to 1.

The remainder of this paper provides an overview of the research findings on lower class size, some special study perspectives, the results of interviews with faculty and parents at the three Lab Schools, the results of a detailed analysis of the educational outcomes at the three Lab School plus two other schools with a reduced student: teacher ratio when compared to schools without these lower class sizes, and some conclusion and recommendations.

Research Perspective

The debate over the effects of class size has been long and contentious. More recent literature has been especially mixed. The primary catalyst of the debate over class size was a meta-analysis of the research on class size research that indicated that student improvements were relatively small for class sizes of about 20 students, but significantly improved for classes with fewer than 15 students (Glass and Smith, 1978). A later report by the Educational Research Service suggested that class size could be as high as 22 students with resulting effectiveness (ERS, 1986). Generally, most researchers suggest that the benefits are greatest when there are class sizes of 15 to 20 students (USED, 1999).

Project STAR, a state of Tennessee 4-year class size reduction demonstration project, showed marked improvement in performance for students in smaller classes (i.e., 15 to 17 students) in kindergarten through grade three when compared to those in regular size classes (i.e., 22 to 25 students) and in regular size classes with a full-time teacher aide (Illig, 1996). Results seem to be most pronounced for disadvantaged and minority students in inner cities and during kindergarten, with only marginal gains afterwards but with sustained effects (Illig, 1996; USED, 1999).

The STAR results prompted California, as well as other states such as Iowa, Maryland, Minnesota, Nevada, New York, and Wisconsin, to implement statewide efforts at class size reduction. Among the findings to date of the STAR program are that "third-grade students in classes reduced to 20 or fewer students performed better than their counterparts in larger classes in 1998-99, continuing the small improvement trend reported for 1997-98. Performance was higher regardless of students' backgrounds, and gains achieved in third grade held for students who then returned to larger classes in fourth grade" (CSR Research Consortium, 2000). This study also found that reduced class sizes provided more individualized instruction.

Other outcomes also have been attributed to smaller class sizes, such as lower retention rate and subsequent more active classroom participation (Harvey, 1993; Illig, 1996), lower referral rate to special education (Snow, 1993), higher teacher morale and less stress (Illig, 1996), more time on instruction and less time on discipline problems (Molnar et al., 1999; Kiser-Kling, 1995), and safer schools (Achilles, 1999; Friedfel, 1998).

However, other researchers dispute these findings (Slavin, 1989). A recent study by RAND (1999) concludes that reducing class size has not made a substantial impact on student achievement. Another study of 277 statistical studies on class size found only 15 with clear positive effects, and 13 with a negative relationship (Hanushek, 1997). A study by the conservative Evergreen Freedom Foundation concluded that "...class size reduction....is among the most expensive and least effective education reform investments..." (Boze, 1999). Many economists have recommended that small classes be targeted to schools where their effects are most needed (Odden, 1990). One very important distinction is the difference between class size and student-teacher ratio (NCDPI, 2000).

Study Perspectives

The last point is especially important when considering this study. Creating a 17:1 student to teacher ratio in a school may reduce class size, but may not result in class sizes that the research has shown to be most effective. In addition, there were several multi-age classes, especially in the comparison schools that had low student-to-teacher ratios.

The exact class sizes for each teacher in each school are presented in Appendix A. However, the average class sizes per grade level per school are presented below in Table I.

TABLE I
Average Class Size by School and Grade Level

	K	1	2	3	4	5
Lab Schools						
School A	15.33	18.75	21.00	20.67	17.33	22.50
School B	17.50	17.00	18.00	20.00	21.00	14.00
School C	19.00	18.25	14.00	17.67	11.00	13.00
Comparison Schools						
School D	14.25	13.92	14.60	14.33	16.75	19.20
School E	19.67	20.33	20.33	16.50	17.25	20.33
State Standards[1]:	23.00	23.00	23.00	26.00	26.00	26.00

As shown above, the average class sizes in Lab Schools were higher than 17 students in all but one school each in kindergarten and in the first, second, and fourth grades and in two schools in the fifth grade (with the other Lab School having a much higher fifth grade average class size). These higher class sizes in these grades is offset by lower class sizes in other grades, resulting in

[1] The State of North Carolina allocates teacher based on these class sizes. However, a waiver for up to 3 additional children per classroom is available from the State, with no additional State funds provided.

an overall 17:1 student to teacher ratio in each school. In other words, a 17:1 ratio does not translate into class sizes of 17 or fewer students.

There are two schools that have also attempted to reduce effective class sizes by converting teacher assistant positions into teaching positions: Schoos D and E. In these two comparison schools, average class sizes were at 17 or less in each grade at School D except for fifth grade, but only in the third grade at School E.[2] The only markedly small class sizes at the Lab Schools were at the second grade in one school and at the fifth grade in two of the schools. Kindergarten through the third grade at School D all had effective class sizes of 14.6 students or less.

Interviews with Lab School Staff and Parents

Focus group interviews were conducted with teachers at each of the Lab Schools. In addition, principals were requested to obtain a group of parents at each Lab School for a focus group interview. This was done at School B and School C, but not at School A. The results of these focus group interviews are presented below by Lab School. The sets of focus group questions used with teachers and with parents are presented in Appendix B.

Elementary School A. Six teachers participated in the focus group. However, one of these was a Special Education teacher, one was a HOST Program teacher, and one was a Reading Recovery teacher. The Reading Recovery teacher worked with 28 students in 4 literacy groups and saw 4 different Reading Recovery students each morning. Of the three regular classroom teachers, one was a kindergarten teacher and the others taught the fourth and fifth grades.

The kindergarten teacher thought her class size (16-18 at School A) was just about right, while the fourth and fifth grade teachers thought their class sizes (which were 20 and 23 students) were much too large. The ideal class size was thought by these teachers to be between 13 students ("to know the children at depth") and 18 students (at the fifth grade). These teachers generally thought that no more than 15 students was right for kindergarten, and 13 to 16 students or 15 to 17 students at the other levels. They believe that although small class sizes are equally helpful to all students and that average and low average students can do well with enough time and help, as class size goes up the amount of therapy and assistance gets diluted. All kindergarten and first grade teachers in this school have a classroom aide, but second grade teachers share an aide. However, each teacher would prefer a smaller class size without an aide.

These teachers attribute the smaller class sizes at School A to an immediate increase in test scores. Even though their student population is changing (i.e., they have experienced a 12 to 15 percent increase in children with greater needs and many more students of different nationalities), their test scores continue to rise. Teachers are able to address individual student needs (e.g., there are more hugs) and students with special needs get more attention, resulting in fewer behavioral problems. It is much more difficult to mainstream and return special education students to regular classrooms when class sizes are larger.

Smaller class sizes at School A also have helped teachers. They can "zoom in" on individual student needs, have more time and ability to deal with children with special needs, are better able to accomplish their lesson plans, have more effective classroom management, and smaller class

[2] School D had several combination-grade, team-taught classes ranging in size from 26 to 28 students with two teachers and 48 students with three teachers. The number of students in these classes was the average across the number of teachers. See Appendix A for actual class sizes.

sizes allow more time for "re-teaching and mastery of objectives so that no [student] is left behind." There also is increased parent participation due to an opportunity to get to know the parents better since there are fewer of them.

Smaller class sizes especially seem to have had the most impact on the basic skills of communication (reading and writing) and mathematics. However, there needs to be a cutoff point where additional students are not added without additional personnel. Also, School A was designated as an ESL (English as a Second Language) school, but the only extra resources provided by the system was a half-time ESL teacher.

Elementary School B. Seven faculty members were interviewed in a focus group at School B, but one was the principal, one was a counselor, and one was the HOST teacher. The fourth teacher arrived after the focus group had begun. In addition, five parents were interviewed in a separate focus group.

Class sizes for these teachers ranged from 18 (for a kindergarten teacher) to 21 students (for a teacher of a grade 3-4 combination class). Two of the teachers felt their class sizes were about right, but the other (a third grade teacher) would prefer a smaller class size of around 17 students. Parents felt that the class sizes were "about right" for their children. Parents indicated the ideal class size would be 17 to 19 students, while all faculty members felt that 17 students was best. All of the faculty members preferred a smaller class size rather than having a teacher aide.

Among the parents, small class sizes were thought to be most beneficial to above average students but faculty members indicated they were equally beneficial to all students. Parents indicated that smaller class sizes help to keep kids focused, with not as many distractions, and are less intimidating to students. In this way, students can learn more, have more time for interaction with the teacher, and get more teacher assistance. Teachers have more time for one-on-one instruction and individualization of instruction, so they can get to know their students, more easily identify students with learning problems, and provide additional help to students as needed. Parents indicated that there were made to feel welcome and teachers would welcome them and talk with them at the end of the school day.

Faculty members indicated that smaller class sizes were especially useful for disadvantaged students. With smaller class sizes, it does not take as long to get students ready for instruction and children pay closer attention to instruction. There was more time for one-on-one instruction, engaging both students and parents, getting to know all students and their parents, and better targeting instruction to meet the needs of the individual students. One goal of Accelerated Learning at the school is to reach every child on his or her level. Grouping is very effective with these smaller class sizes, with buddy classes and literacy groups of 3 to 5 students.

Reading is especially impacted by the smaller class sizes, allowing for individual reading and assessment, with immediate feedback and time for remediation. Writing and mathematics instruction also benefit as there is more time for the use of manipulatives and feedback. Smaller class sizes also allow for schoolwide interdisciplinary instruction.

Many of the faculty members went to School B just because of its smaller class sizes. Some parents have made extra efforts to keep their students at this school, and many out-of-attendance area students attend there. Among the outcomes they have witnessed are social skills development in students, more higher level writing scores, and more parent involvement.

Elementary School C. Six faculty members were interviewed in a focus group at School C—three kindergarten teachers and three first grade teachers. In addition, three parents were interviewed in a separate focus group.

Class size for these teachers was 19 (for kindergarten teachers) or 20 (for first grade teachers). Class size had been about 22 students per class before the Lab School was established. Half of these teachers felt these class sizes were about right, especially if students were without special needs and functioning on level, and half felt they were slightly too large, due to the extremely small sized classrooms in the school. However, some teachers were disappointed that class sizes were as big as they are. Several of these teachers felt it was very difficult to do small group work when confined to such a small teaching space, as there are very small classrooms at School C. Parents generally agreed with these teacher assessments on class size, but feel that the ideal class size would be from 10 to 12 students, with no more than 12 students in a classroom. This would allow for better classroom control and more time to complete paperwork.

All of these teachers had a full-time teacher aide and feel that aides are absolutely necessary to help maintain classroom discipline. Parents felt that smaller class sizes were more important than aides, especially for students in the intermediate grades.

Both teachers and parents had differing ideas about who benefited the most from smaller class sizes. Although some teachers felt they most benefit students who are behind academically or those with emotional problems, another felt they are equally beneficial to all students. Parents felt they benefit students who are behind by giving them more time, but also above average students by providing them with more guidance. Both groups felt there was a greater chance for individualized student attention, often helping where the "home" was not meeting student needs. Teachers have more time to deal with the whole child (e.g., "learn their personalities"; meet individual needs), can better focus their instruction, and provided better discipline and classroom control. Teachers indicated they had less paper work, so they have more time to refer students (such as to the Student Assistance Program). They also can become more personal with each child's parent(s) or guardian.

Small class sizes really help in the teaching of reading and in pinpointing individual student needs. Whole group mathematics instruction was possible, with small groups to differentiate needs for additional instruction.

Educational Outcomes

The three Lab Schools can be considered to be an experimental treatment. The lowering of class sizes at Schools D and E by "trading in" teacher aides results in a comparison group of schools. The remaining 22 schools in Durham Public Schools were considered to be a control group of schools, in that they had more traditional class sizes.

The educational progress at these three groups of schools (experimental Lab Schools, comparison reduced class size schools, and control group schools) can be compared utilizing existing student performance data. For kindergarten through the second grade, performance can be compared on the appropriate beginning and end of year administrations of tasks of Marie Clay's *Observation Survey* and the *Developmental Reading Assessment (DRA)*. For grades three through five, performance can be compared on yearly growth on the North Carolina End of Grade Test. In each instance, pretest and posttest scores are available for both the Lab Schools (Schools A, B,

and C) and the Comparison Schools (Schools D and E) as well as for matched "Control School" groups of students for each Lab School.

For the Control Group schools, one could look at their pretest and posttest scores as well. However, the Lab Schools and Comparison Schools are all inner city schools with large proportions of disadvantaged children. It was felt that a fairer comparison would be to compute the average posttest score for each possible pretest score at each of the remaining 22 non-Lab or Comparison schools. In other words, for every possible pretest score, the average posttest score obtained by students at these 22 Control Group Schools was computed. In this way, for each Lab School or Comparison School student pretest score, a "matched student" posttest score could be used consisting of this average posttest score for the given pretest score. For example, a student at one of the Lab Schools with a pretest score on Letter Identification of 25 was given a "matched" Control Group student, whose pretest score was 25 and whose posttest Letter Identification score was the average score obtained by all students in the 22 Control Group Schools whose pretest score was 25. Thus, for every Lab School, there was a Control Group "school" of the same name comprised of "students" who were matched one-on-one to Lab School students on their pretest scores.

The results of these analyses are presented in the following sections by grade level. Thus, there are separate analyses for grades kindergarten through five.

Kindergarten Performance. Table II below presents the average scores for each treatment, comparison, and control group for kindergarten students.

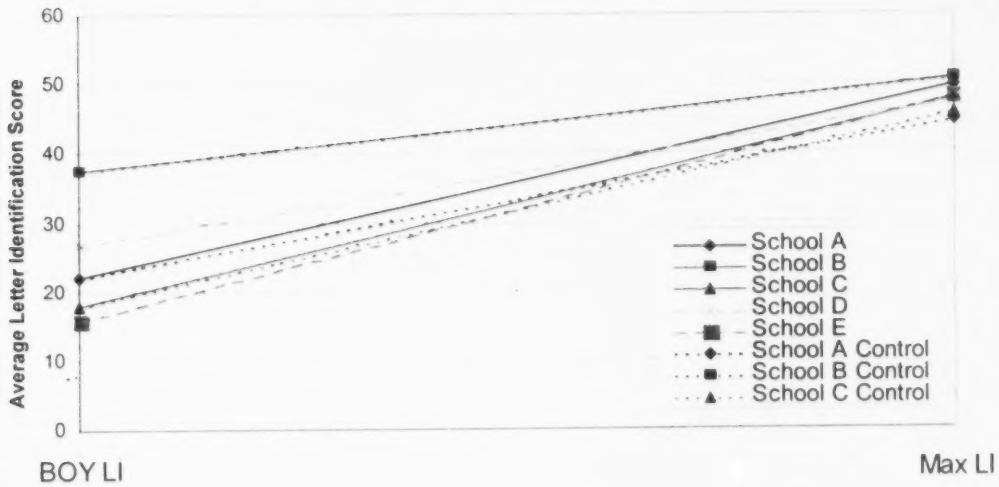
TABLE II
Statistics for Kindergarten Students

		Beginning of Year Letter ID			Maximum Letter Identification		
Treatment	**School**	**Mean**	**N**	**S.D.**	**Mean**	**N**	**S.D.**
Lab School	School A	22.0	45	20.64	49.4	45	10.23
	School B	37.4	29	17.13	50.4	29	8.89
	School C	17.7	54	16.20	47.6	54	12.80
	Total	23.7	128	19.53	48.9	128	11.11
Comparison School	School D	26.7	92	20.45	47.5	92	12.59
	School E	15.7	47	17.25	48.0	47	10.94
	Total	23.0	139	20.06	47.6	139	12.02
Control School	School A Control	22.0	45	20.64	44.6	45	7.76
	School B Control	37.4	29	17.13	50.7	29	2.28
	School C Control	17.7	54	16.20	45.6	54	6.09
	Total	23.7	128	19.53	46.4	128	6.56

As shown above, the average pretest scores for Lab Schools and their matched Control Schools are identical, since they were matched on pretest score. Two of the three Lab Schools (School A and School C) outperformed their Control counterparts, while School B performed about the same as its Control group. While School E outperformed any of the Lab Schools in terms of score gains, Schools A and C outperformed School D. Thus, although School D had the smallest

average kindergarten class size, all of the other schools except for School B outperformed them. These results are presented graphically in Figure 1 below.

Figure 1. Performance of Lab School, Comparison, and Control Kindergarten Students on Letter ID



A univariate analysis of covariance using the maximum Letter Identification score as the outcome variable and the beginning of the year Letter Identification score as the covariate indicated that the growth in Letter Identification was highly significant ($F= 114.88$; $df= 1, 391$; $p< .001$). However, the difference between treatment groups, although it favored the Lab Schools, was not significant ($F= 2.43$; $df= 2, 391$; $p< .089$).

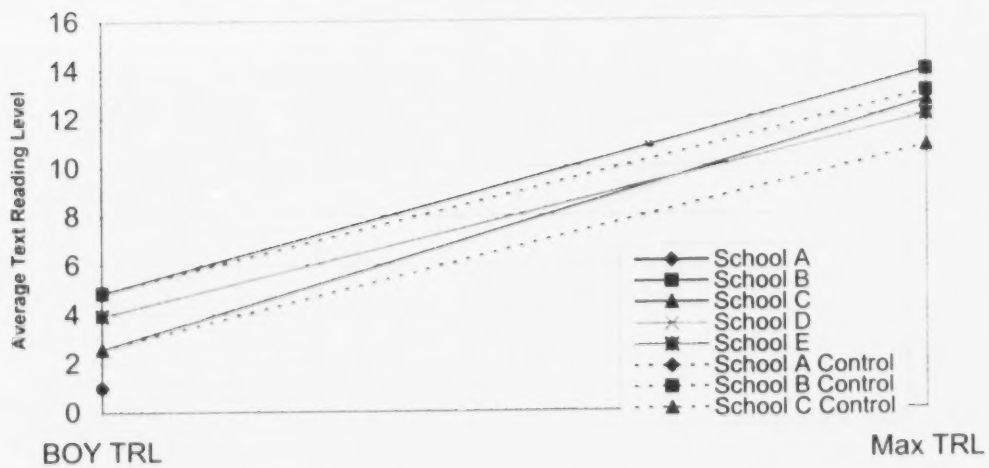
First Grade Performance. Table III below presents the average scores for each treatment, comparison, and control group for first grade students. Two of the three Lab Schools (Schools A and C) outperformed their Control counterparts, while School B performed slightly lower than its Control group. Schools D and E performed at about the same rate as each other, which was lower than for each Lab School except for School B. These results are presented graphically in Figure 2.

A univariate analysis of covariance using the maximum Text Reading Level as the outcome variable and the beginning of the year Text Reading Level as the covariate indicated that the growth in Text Reading Level was highly significant ($F= 299.79$; $df= 1, 496$; $p< .001$). However, the difference between treatment groups was ~~not~~ significant ($F= 3.46$; $df= 2, 496$; $p< .032$), although once again it favored the Lab Schools.

TABLE III
Statistics for First Grade Students

		Beginning of Year Text Reading Level			Maximum Text Reading Level		
Treatment	**School**	**Mean**	**N**	**S.D.**	**Mean**	**N**	**S.D.**
Lab School	School A	4.8	68	3.22	13.8	68	4.63
	School B	5.3	38	4.01	12.5	38	5.34
	School C	2.6	74	4.14	12.6	74	5.64
	Total	4.0	180	3.96	13.1	180	5.22
Comparison School	School D	3.9	83	4.38	12.0	83	6.18
	School E	4.1	57	3.68	12.3	57	5.28
	Total	4.0	140	4.10	12.1	140	5.81
Control School	School A Control	4.8	68	3.22	13.0	68	2.63
	School B Control	5.3	38	4.01	13.0	38	2.60
	School C Control	2.6	74	4.14	10.7	74	4.94
	Total	4.0	180	3.96	12.1	180	3.90

Figure 2. Performance of Lab School, Comparison, and Control First Grade Students on Text Reading Level



Second Grade Performance. Table IV presents the average scores for each treatment, comparison, and control group for second grade students. Both Lab Schools B and C performed very well, but were outperformed by School E. Although School D demonstrated a substantial

gain, there was almost no gain made at the School A Lab School. These results are presented in Figure 3.

TABLE IV
Statistics for Second Grade Students

		Beginning of Year Text Reading Level			Maximum Text Reading Level		
Treatment	**School**	**Mean**	**N**	**S.D.**	**Mean**	**N**	**S.D.**
Lab School	School A	21.4	21	6.84	22.0	21	6.22
	School B	16.6	35	5.04	21.5	35	5.31
	School C	18.6	58	8.13	24.3	58	6.19
	Total	18.5	114	7.21	23.0	114	6.04
Comparison School	School D	14.7	73	7.56	19.9	73	6.37
	School E	15.1	48	5.77	21.9	48	6.20
	Total	14.9	121	6.88	20.7	121	6.36
Control School	School A Control	21.4	21	6.84	22.5	21	4.49
	School B Control	16.6	35	5.04	21.4	35	3.93
	School C Control	18.6	58	8.13	22.7	58	5.92
	Total	18.5	114	7.21	22.3	114	5.12

Figure 3. Performance of Lab School, Comparison, and Control Group Second Grade Students on Text Reading Level

A univariate anlysis of covariance using the maximum Text Reading Level as the outcome variable and the beginning of the year Text Reading Level as the covariate indicated that the growth in Text Reading Level was highly significant ($F = 570.00$; $df = 1, 345$; $p < .001$). However,

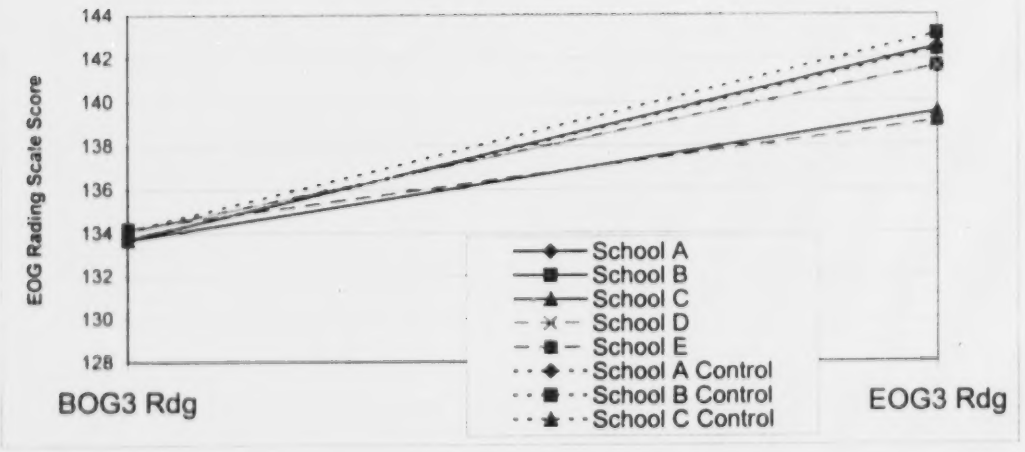
the difference between treatment groups was not significant (F= 1.77; df= 2, 345; p< .172). Although the Lab Schools outperformed their Control Groups, as a group they did not perform as well as the Comparison Schools.

Third Grade Performance. Table V presents the average scores for each treatment, comparison, and control group for third grade students. The School A Lab School performed as well as their Control Group counterparts, but the other two Lab Schools did not do as well. The Comparison Group students did even less well. School E had the lowest performing third grade, followed by School C. These results are presented in Figure 4.

TABLE V
Statistics for Third Grade Students

		Beginning of Year Text Reading Level			Maximum Text Reading Level		
Treatment	**School**	**Mean**	**N**	**S.D.**	**Mean**	**N**	**S.D.**
Lab School	School A	133.7	58	7.02	142.5	58	8.38
	School B	134.1	25	7.25	141.6	25	7.36
	School C	133.7	51	6.23	139.5	51	7.36
	Total	133.8	134	6.72	141.2	134	7.89
Comparison School	School D	134.1	50	7.53	141.6	50	9.91
	School E	134.2	51	7.07	139.1	51	7.81
	Total	134.2	101	7.26	140.3	101	8.95
Control School	School A Control	133.7	58	7.02	142.5	58	5.98
	School B Control	134.1	25	7.25	143.1	25	5.43
	School C Control	133.7	51	6.23	142.4	51	5.09
	Total	133.8	134	6.72	142.6	134	5.52

Figure 4. Performance of Lab School, Comparison, and Control Group Third Grade Students on NC EOG Reading Test



A univariate analysis of covariance using the third grade End of Grade reading scale score as the outcome variable and the beginning of third grade reading scale score as the covariate indicated that the growth in reading was highly significant ($F= 355.04$; $df= 1, 365$; $p< .001$). In addition, the difference between treatment groups also was significant ($F= 6.76$; $df= 2, 365$; $p< .001$) and favored the Control Group, primarily due to the poor performance at School C.

Fourth Grade Performance. Table VI presents the average scores for each treatment, comparison, and control group for fourth grade students.

TABLE VI
Statistics for Fourth Grade Students

		Beginning of Year Text Reading Level			Maximum Text Reading Level		
Treatment	**School**	**Mean**	**N**	**S.D.**	**Mean**	**N**	**S.D.**
Lab School	School A	144.1	54	9.21	147.4	54	8.79
	School B	142.9	27	8.00	151.2	27	6.01
	School C	142.3	33	6.58	146.3	33	7.18
	Total	143.3	114	8.21	148.0	114	7.91
Comparison School	School D	142.9	54	9.05	145.6	54	10.26
	School E	143.5	45	9.59	145.8	45	9.98
	Total	143.1	99	9.26	145.7	99	10.08
Control School	School A Control	144.1	54	9.21	148.1	54	7.38
	School B Control	142.9	27	8.00	147.1	27	6.48
	School C Control	142.3	33	6.58	146.4	33	5.29
	Total	143.3	114	8.21	147.4	114	6.61

The School B Lab School doubled the best performance of anyone else in terms of gain in scale score points and, as a group, the Lab Schools outperformed the Control Group and the Comparison Group. However, this performance was primarily due to School B as every Control Group school outperformed the other two Lab Schools. The Comparison Group schools were the lowest performing schools. These results are presented in Figure 5 on the following page.

A univariate anlysis of covariance using the fourth grade End of Grade reading scale score as the outcome variable and the end of third grade reading scale score as the covariate indicated that the growth in reading was highly significant ($F= 593.05$; $df= 1, 323$; $p< .001$). In addition, the difference between treatment groups also was significant ($F= 5.27$; $df= 2, 323$; $p< .006$) and favored the Lab Schools and Control Group over the Comparison Group.

Fifth Grade Performance. Table VII below presents the average scores for each treatment, comparison, and control group for fifth grade students. As a group, the Lab Schools were outperformed by both the Control Group and the Comparison Group. However, this lowered performance was primarily due to the performance at School A, as the other two Lab Schools were at or near the Control Group and comparison Group average scale score gains. These results are presented in Figure 6.

Figure 5. Performance of Lab School, Comparison, and Control Group Students on Fourth Grade NC EOG Reading Test

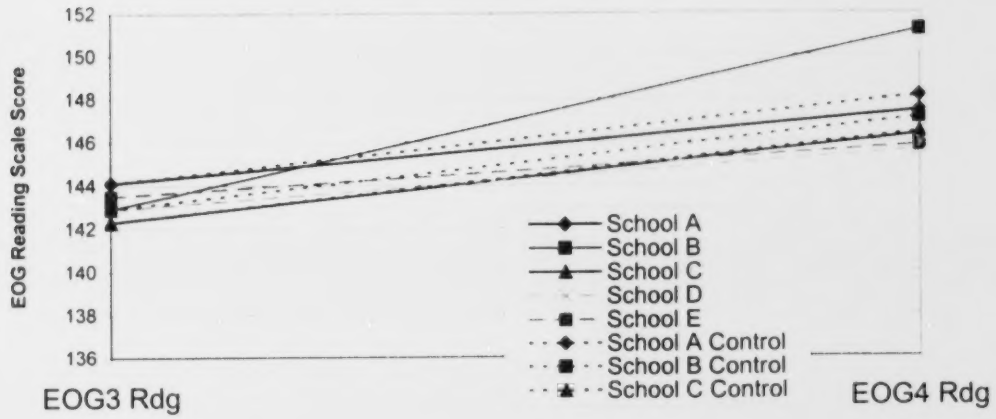
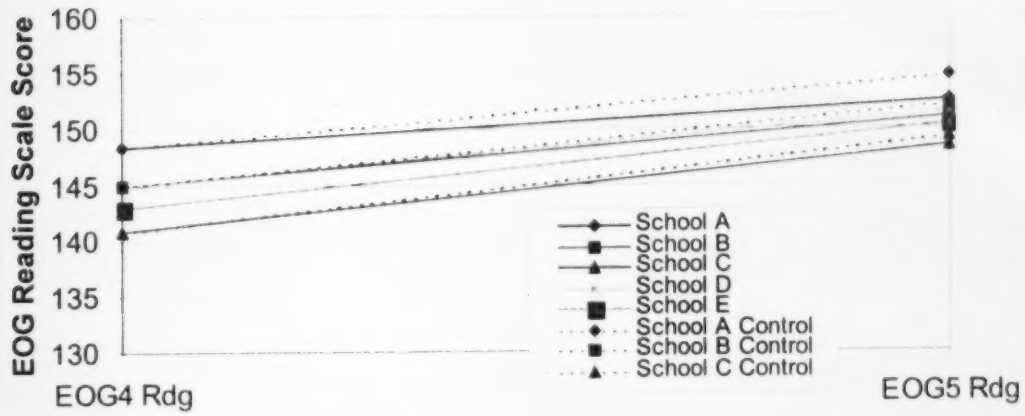


TABLE VII
Statistics for Fifth Grade Students

		Beginning of Year Text Reading Level			Maximum Text Reading Level		
Treatment	**School**	**Mean**	**N**	**S.D.**	**Mean**	**N**	**S.D.**
Lab School	School A	148.4	35	10.17	152.3	35	7.57
	School B	144.9	23	7.82	151.0	23	4.92
	School C	140.9	40	8.84	148.4	40	8.69
	Total	144.5	98	9.61	150.4	98	7.68
Comparison School	School D	144.9	84	8.80	151.4	84	7.75
	School E	142.9	55	8.18	150.3	55	7.49
	Total	144.1	139	8.58	151.0	139	7.64
Control School	School A Control	148.4	35	10.17	154.6	35	7.63
	School B Control	144.9	23	7.82	152.0	23	5.98
	School C Control	140.9	40	8.84	149.2	40	6.42
	Total	144.5	98	9.61	151.8	98	7.12

A univariate anlysis of covariance using the fifth grade End of Grade reading scale score as the outcome variable and the end of fourth grade reading scale score as the covariate indicated that the growth in reading was highly significant ($F= 703.56$; $df= 1, 331$; $p< .001$). The difference between treatment groups approached significance ($F= 2.54$; $df= 2, 331$; $p< .081$) and favored the Control Group and Comparison Group over the Lab Schools.

Figure 6. Performance of Lab School, Comparison, and Control Group Students on Fifth Grade NC EOG Reading Test



Discussion

It must be emphasized that there is the difference between student-teacher ratio and class size. At the three Lab Schools, teachers are assigned to each school based on a 17-to-1 student to teacher ratio. This does not necessarily result in class sizes of 17 students. Indeed, at the three Lab Schools, class sizes of 17 or smaller existed only in half of the classes. Actual class sizes in these schools ranged from as low as 10 students to as many as 23 students.

Conclusions

Where average class size in the Lab Schools was noticeably low (e.g., 15 students or less), there were mixed results associated with gains in performance. For example, the lowest average class size in the fourth grade was 11 students at School C. Students in these classes demonstrated a full year's growth while students at School B, with an average class size of 21 students, showed two years of growth. In the fifth grade, both Schools B and C had average class sizes of 14 or less and these two Lab Schools greatly outperformed School A, which had an average class size of 22.5 students. Students in the second grade at School C (with an average class size of 14 students) performed about the same as their counterparts at School B (with an average of 18 students), but both of these schools greatly outperformed School A (which had an average class size of 21 students) and showed almost no growth.

However, there was almost no difference in performance in the first grade between Comparison Schools at Schools D and E, even though there was a 30 percent difference in class size (20 versus 14 students) and the Lab School with the smallest class size, School B (the only Lab School with a class size of 17), demonstrated the least growth among the Lab Schools.

Thus, although class size seems to have a relationship to student performance at the Lab Schools, it is not an absolute relationship.

Overall, the Lab Schools seems to be having the most effect during the primary grades. Students in kindergarten, first grade, and second grade at the Lab Schools are performing better than students in typical classes throughout the school system who begin at the same level of performance. As a group, they also perform better at the fourth grade, but these results are primarily due to one of the Lab Schools as the other two perform more poorly than their Control Group counterparts. At the third and fifth grades the Lab School students do not perform as well as their systemwide counterparts.

In conclusion, it would appear that the Lab Schools are having a definite positive impact, especially in the primary grades. This somewhat reflects the literature review that indicate early success in the primary grades is possible with smaller class sizes, but not as probable during the intermediate grades.

References

Achilles, C.M. (1999). Let's put kids first, finally. Thousand Oaks, CA: Corwin Press, Inc.

Boze, D. (1999). An examination of class size. In Brief, 9 (2). Evergreen Freedom Foundation, May 25.

CSR Research Consortium (2000). California's push for smaller classes continues to yield modest achievement gains, but shortage of qualified teachers widens. Press Release. June 28.

Educational Resource Service (ERS) (1986). Class size research: A critique of recent meta-analyses. Arlington, VA.

Friedfel, S. (1998). Research on improving school safety: The role of technology and reduced class size. American Federation of Teachers. August.

Glass, G. and Smith, M.L. (1978). Meta-analysis of the relationship of class size and student achievement. San Francisco: Far West Laboratory for Educational Research.

Hanushek, E.A. (1997). The evidence on class size. University of Rochester/Wallis Institute. September.

Harvey, B. (1993). An analysis of grade retention for pupils in K-3. Unpublished doctoral dissertation. Greensboro, NC: University of North Carolina at Greensboro.

Illig, D.C. (1996). Reducing class size: A review of the literature and options for consideration. Prepared a the request of Senator Lucy Killea. Sacramento, CA: California Research Bureau. June 11.

Kiser-Kling, K. (1995). Life in a small teacher-pupil ratio class. Unpublished Ed.D. dissertation. Greensboro, NC: University of North Carolina at Greensboro.

Molnar, A., Smith, P., Zahorik, J., Palmer, A., Halbach, A. and Ehrle, K. (1999). Evaluating the SAGE Program: A pilot program in targeted pupil-teacher reduction in Wisconsin. Educational Evaluation and Policy Analysis (EEPA, 21 (2), pp. 165-177), Summer. Washington, DC: American Educational Research Association.

North Carolina Department of Public Instruction (NCDPI) (2000).

Odden, A. (1990). Class size and student achievement: Research-based policy alternatives. Educational Evaluation and Policy Analysis (EEPA, 12 (2), pp. 213-227).

RAND (1999). Crowding out: Small classes teach a lesson in unintended consequences. RAND Review, Fall.

Slavin, R.E. (1989). Class size and student achievement: Small effects of small classes. Educational Psychologist (24).

Snow, M. (1993). The 1993 Class Size Reduction Evaluation Study. Reno, NV: Nevada Department of Education.

United States Department of Education (USED) (1999). Local success stories: Reducing class size. November.

APPENDIX A

Class Sizes for Lab Schools and Comparison Schools

Class Sizes

School B

K	Sadie Alston	18
K	Jacqueline McElroy	17
1	Denise Avant	17
1	Marcia Carpenter	17
2	Charlesetta Morgan	18
2	Jennifer Miller	18
3	Mary Williams	19
3-4	Sharon Watford	9(3), 12(4)
4	Heath Banks	21
5	Sarah Brown	15
5	Chaund Covington	13

School E

K	Joyce Das	20
K	Elizabeth Lawson	19
K	Patricia Saylor	20
1	Stephen Strange	20
1	Deborah Laws	21
1	Arikka Jeralds	20
2	Tomara Morgan	20
2	Patricia LeSueur	20
2	Kathy Neff	21
3	Wende Daquano	16
3	Judy Hobbs	18
3	Cathy Carinder	15
3	Cynthia Bynum	17
4	Sarni Bensman	19
4	John Williams	19
4	Beverly McNeill	15
5	Susan Harward	21
5	Tina Bunch	20
5	Keturah McCall	20

School A

K	Connie M. Bethea	15
K	Janneke Pulliam	14
K	Claude R. Solomon	17
1	Lisa Barnes	18
1	Shelia Brown	19
1	Lisa R. Eley	18
1	Arthur T. Hicks, III	20

School D

K	Linda Kirby	15
K	Candace Howard	15
K	Eileen Nagler	15
K	Claudio Romero	14
K	Carla Magyesi	13
K-1	Tichnor/Wilcox	14(K),13(1)
1	Darlene Adams	15
1	Delores Catarroj	15
1	Julie Killgoar	13
1-2	Damon/Goodhand	12(1),14(2)
1-2	Franklin/Grogan	11(1),17(2)

School A (Cont.)

2	Regina Daniel	21
2	Renita Hobbs	20
2	Regina Lewis	22
3	Kimberly Allen	20
3	Stacie Johnson	21
3	Mary Thompson	21
4	Annette Brown	17
4	Keisha Jones	18
4	Maureen McKenna	17
4	Fannie Spruill	17
5	Willie Farmer	22
5	Jessie Streeter	23

School C

K	Shannon Bullard	19
K	Marcia Robinson	19
K	Karen Thompson	19
1	Michelle Dunbar	20
1	Stassi Jackson	17
1	Masa Kinsey	20
1	Paulette Richard	16
2	Ada Fields	14
2	Roxie Pitt	13
2	Sondra Walker	15
2	Sebrina Williams	14
3	Robert Anna	19
3	Sandra Cherry	17
3	Alison Hale	17
4	Judith Barrett	11
4	Aisha Howard	12
4	Tobi Radden	10

School D (Cont.)

2	Renae Dickerson	16
2	Yvonne Green	16
2-3	Beahm/Starnes	17(2),11(3)
3	Rosena Freeman	14
3	Sabrina Glaspie	13
3	Kulvinder Green	12
3-4	Jennifer Gardner	1(3),16(4)
3-5	Hill/Knight/Line	12(3),17(4),19(5)
4	Connie Dickens	17
4	Kathy Travers	17
5	Karen Leake	19
5	Micara Lewis	20
5	Joy Sullenberger	20
5	Minnie Washington	21

School C (Cont.)

5	Juliet Blackmon	10
5	Akiesha Ortiz	13
5	Varetta Walker	15

APPENDIX B

Focus Group Questions

Lab School Focus Group Questions
Teachers

1. How many students do each of you have in your classrooms?

10:	16:
11:	17:
12:	18:
13:	19:
14:	20:
15:	21:

2. Is your class size?

   Much too large:
   Slightly too large:
   About right:
   Slightly too small:
   Much too small:

3. In your opinion, what would be the ideal class size?

10:	16:
11:	17:
12:	18:
13:	19:
14:	20:
15:	21:

4. Do you have a teacher aide?

   Yes:
   No:

5. Would you prefer a larger class size with an aide, what you presently have, or a smaller class size by yourself?

   Larger class size with an aide:
   Present arrangement:
   Smaller class size:

6. Do you think that smaller class sizes are more helpful to:

   Students behind academically:
   Students without support structures at home:
   Average students:
   Above average students:
   Equally to all students:

7. In what ways have the smaller class sizes here at _____ helped students?

8. In what ways have the smaller class sizes here at _____ helped teachers?

9. Are there particular subject areas where smaller class sizes seem to have the most impact?

10. What other comments do you have about the practice of using smaller class sizes?

Lab School Focus Group Questions
Parents

1. Is the class size for your child's class?

   Much too large:
   Slightly too large:
   About right:
   Slightly too small:
   Much too small:

2. In your opinion, what would be the ideal class size?

10:	16:
11:	17:
12:	18:
13:	19:
14:	20:
15:	21:

3. Would you prefer a larger class size with an aide, what you presently have, or a smaller class size by yourself?

   Larger class size with an aide:
   Present arrangement:
   Smaller class size:

4. Do you think that smaller class sizes are more helpful to:

   Students behind academically:
   Students without support structures at home:
   Average students:
   Above average students:
   Equally to all students:

5. In what ways do you think that smaller class sizes help students?

6. In what ways do you think smaller class sizes help teachers?

7. What other comments do you have about the practice of using smaller class sizes?